20070154304

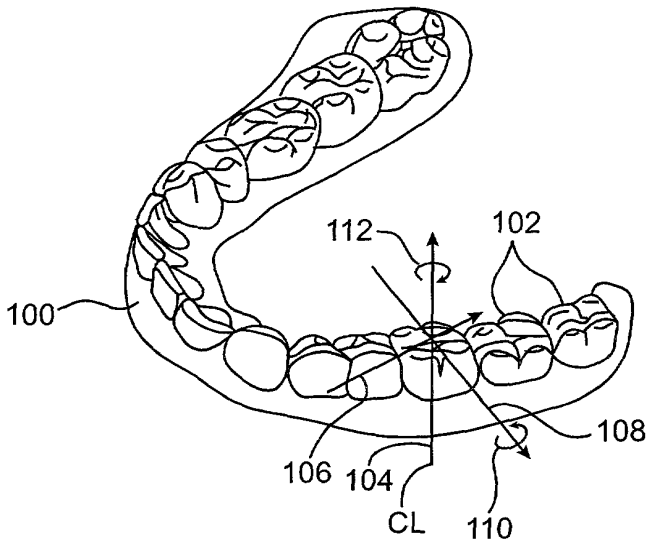

FIG. 1A

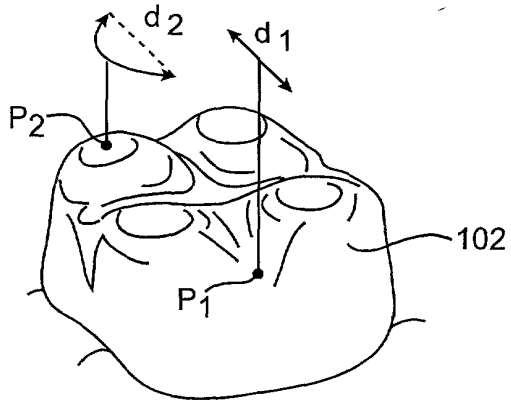

FIG. 1B

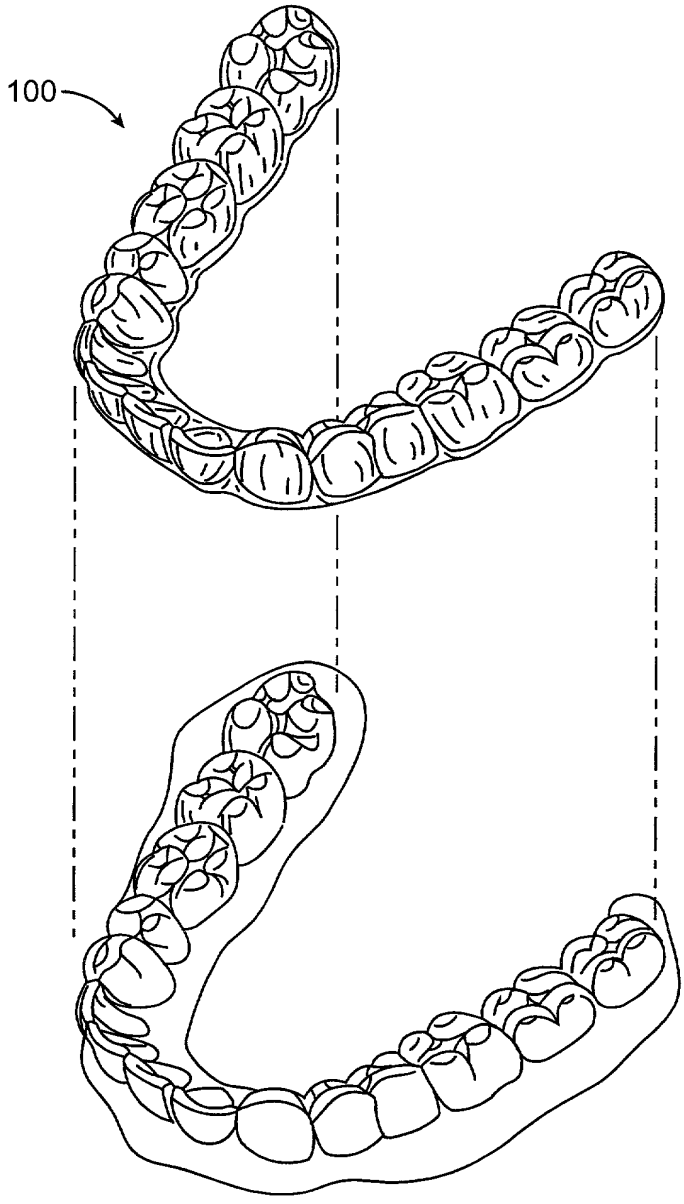

FIG. 1C

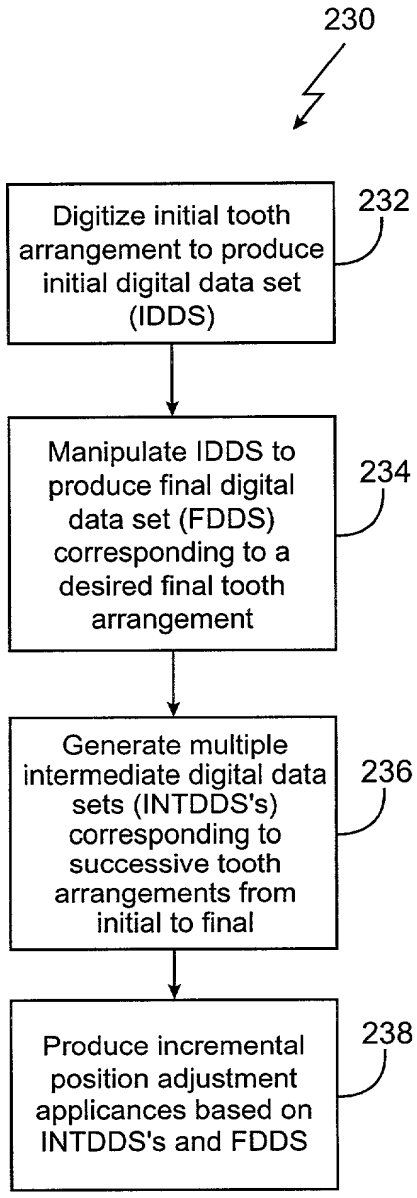
230
Digitize initial tooth arrangement to produce initial digital data set (IDDS)
232
Manipulate IDDS to produce final digital data set (FDDS) corresponding to a desired final tooth arrangement
234
Generate multiple intermediate digital data sets (INTDDS's) corresponding to successive tooth arrangements from initial to final
236
Produce incremental position adjustment applicances based on INTDDS's and FDDS
238

FIG. 2

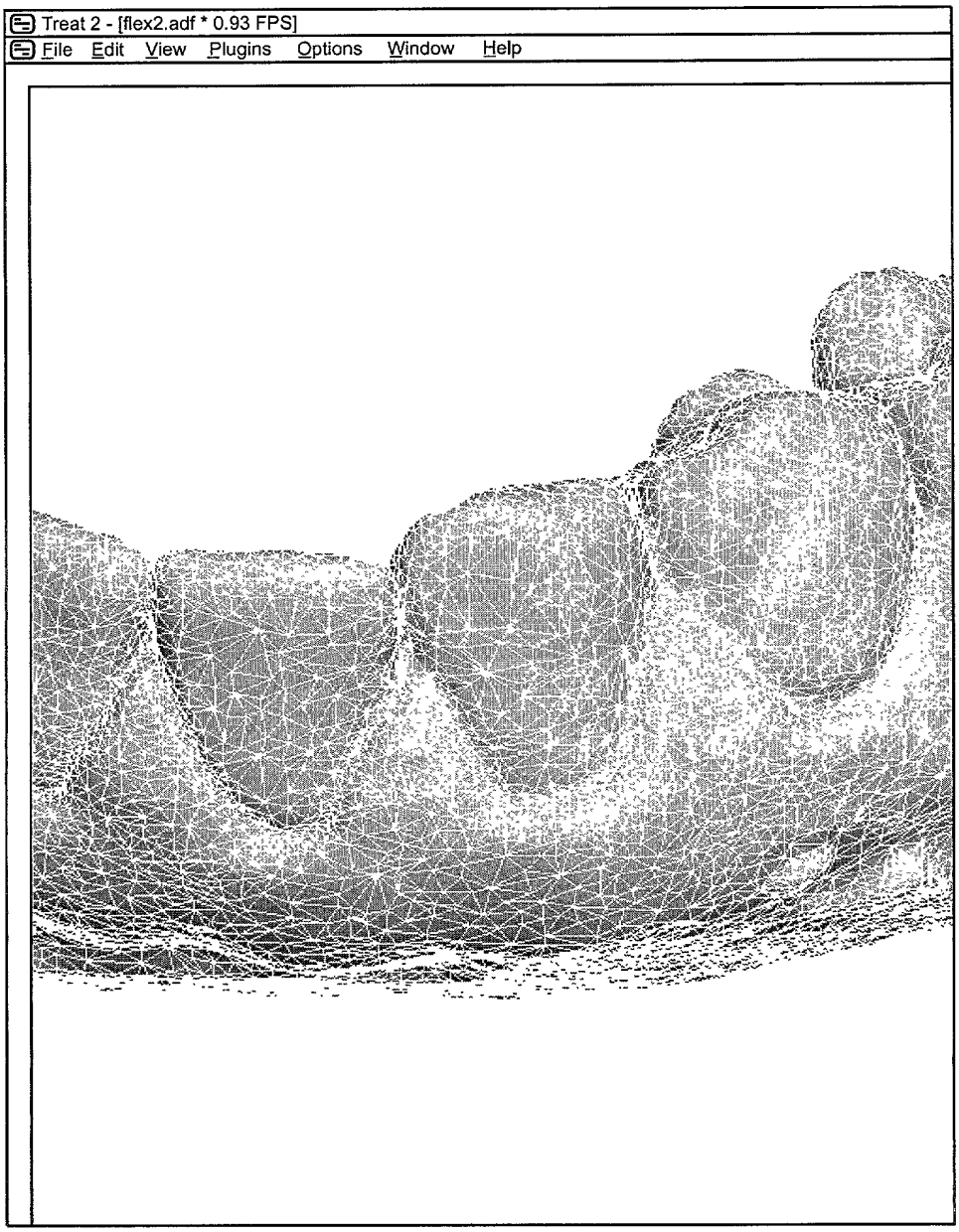
Treat 2 - [flex2.adf * 0.93 FPS]
File Edit View Plugins Options Window Help

FIG. 3

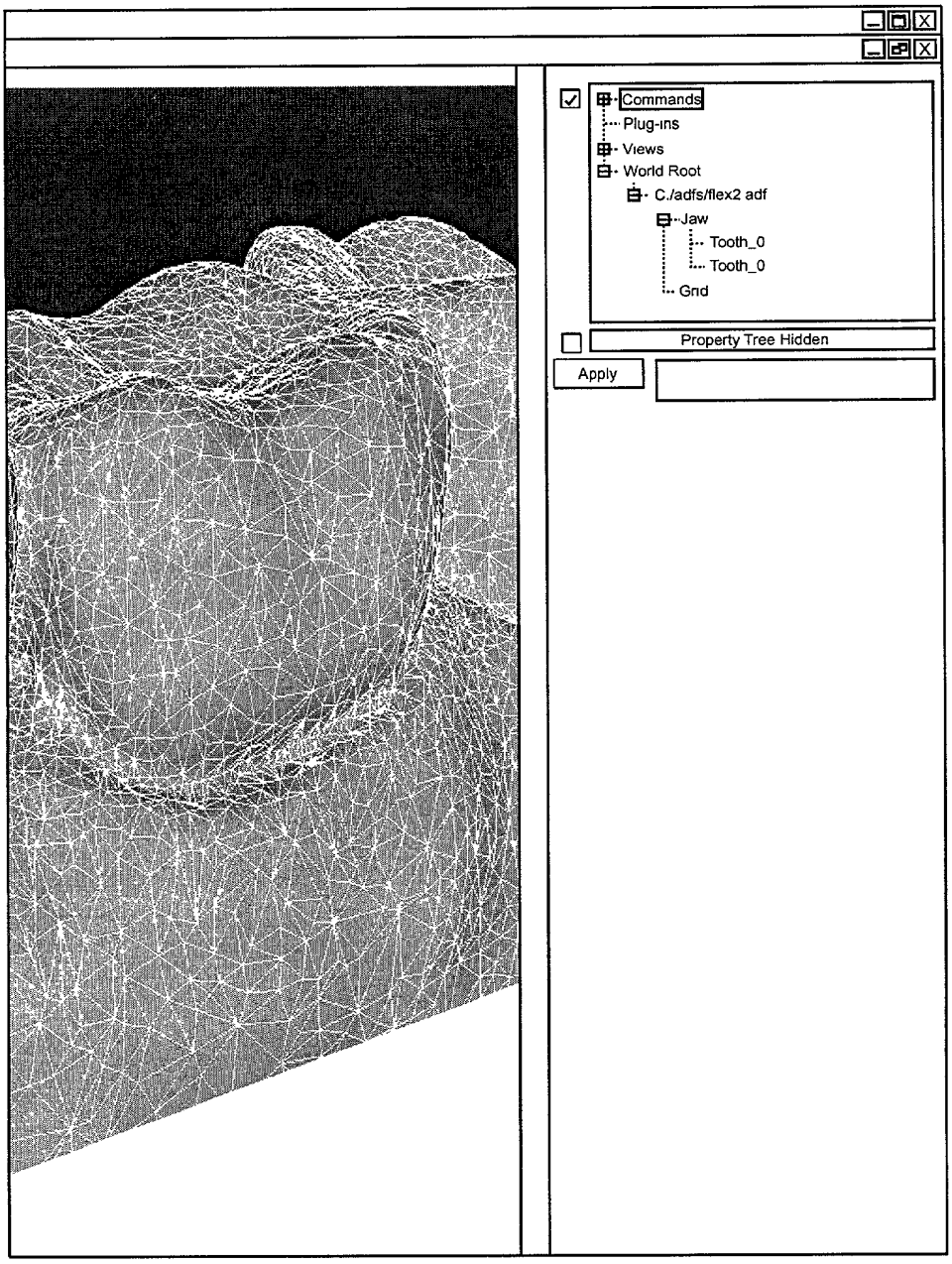
Commands
Plug-ins
Views
World Root
C./adfs/flex2 adf
Jaw
Tooth_0
Tooth_0
Grid
Property Tree Hidden
Apply

FIG. 3 (cont.)

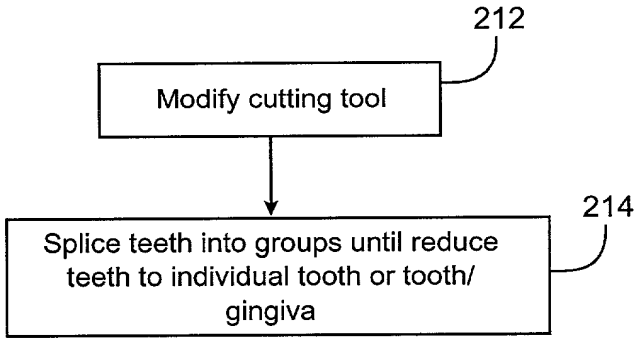
212
Modify cutting tool
214
Splice teeth into groups until reduce teeth to individual tooth or tooth/ gingiva

FIG. 4

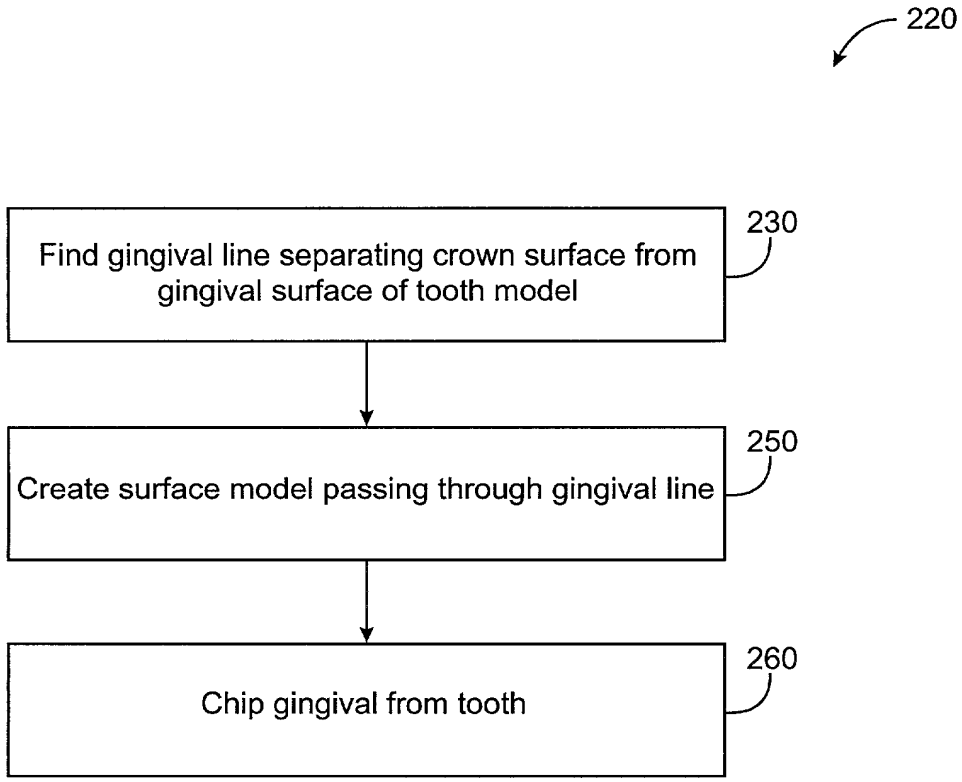
220
Find gingival line separating crown surface from gingival surface of tooth model
230
Create surface model passing through gingival line
250
Chip gingival from tooth
260

FIG. 5

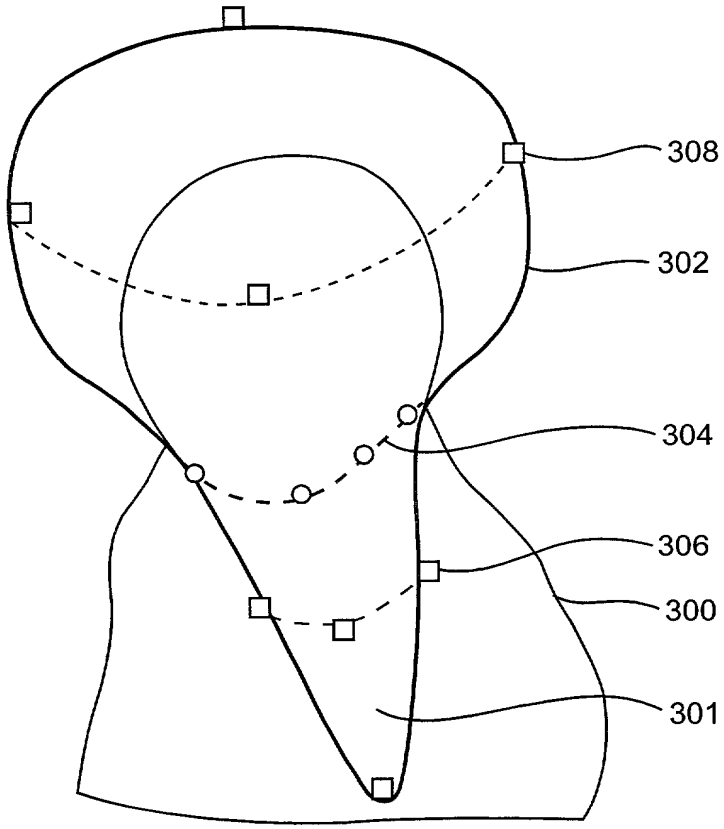

FIG. 6

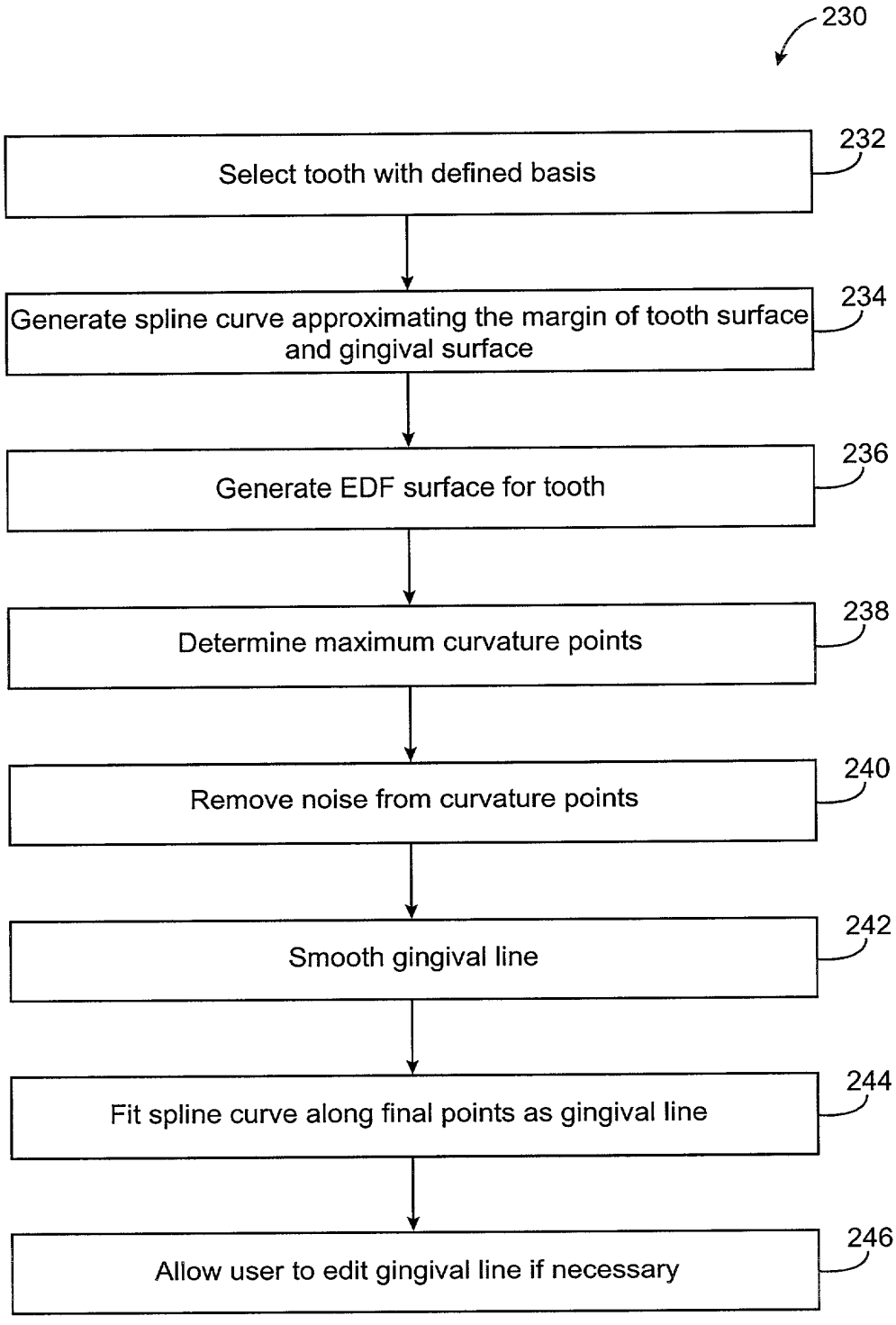
230
Select tooth with defined basis
232
Generate spline curve approximating the margin of tooth surface and gingival surface
234
Generate EDF surface for tooth
236
Determine maximum curvature points
238
Remove noise from curvature points
240
Smooth gingival line
242
Fit spline curve along final points as gingival line
244
Allow user to edit gingival line if necessary
246

FIG. 7

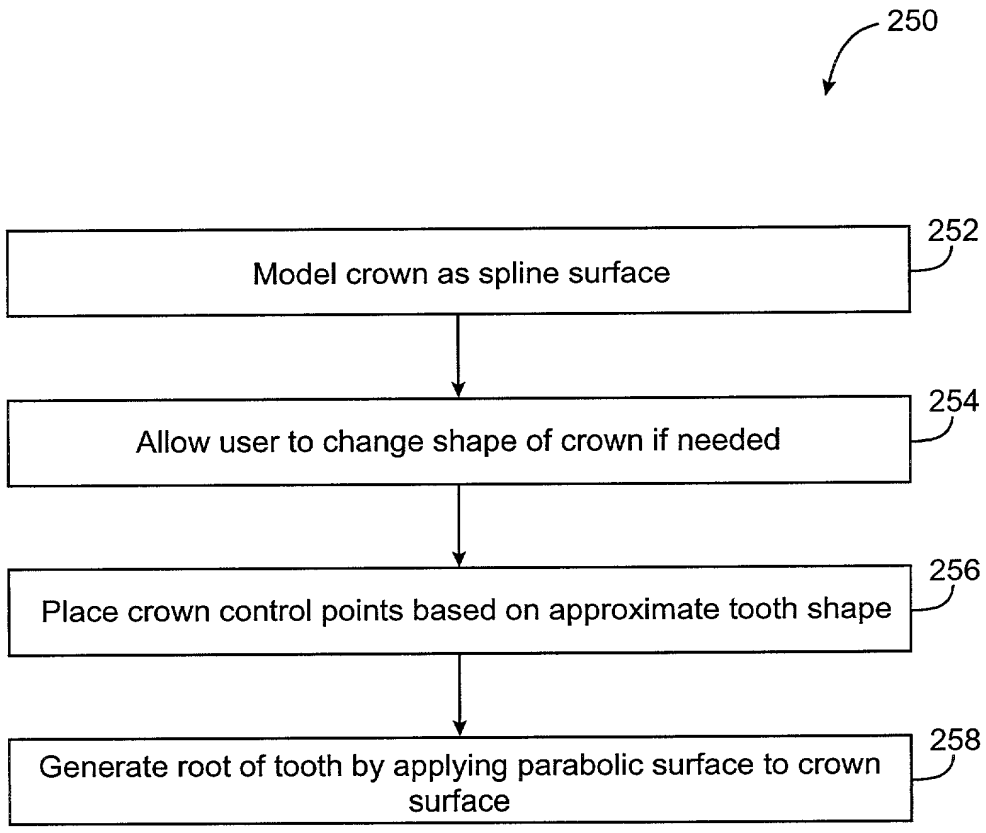
250
Model crown as spline surface
252
Allow user to change shape of crown if needed
254
Place crown control points based on approximate tooth shape
256
Generate root of tooth by applying parabolic surface to crown surface
258

FIG. 8A

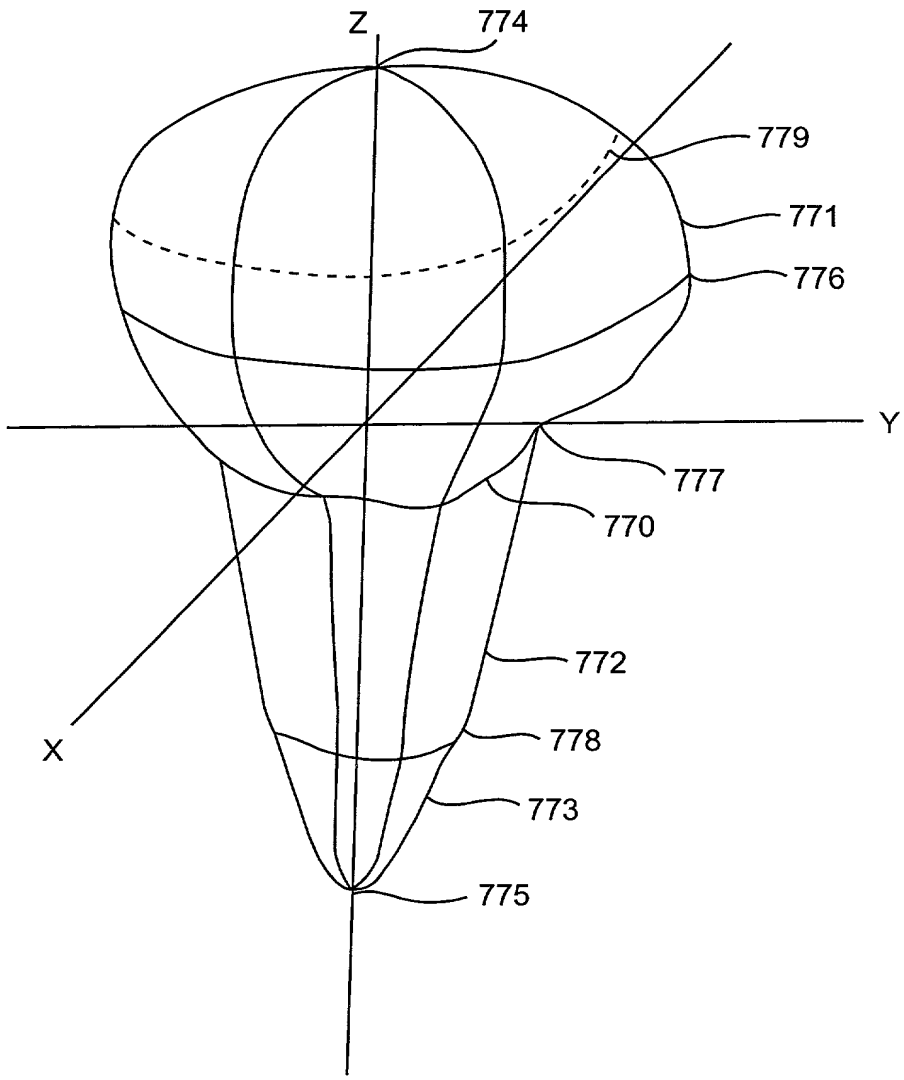

FIG. 8B

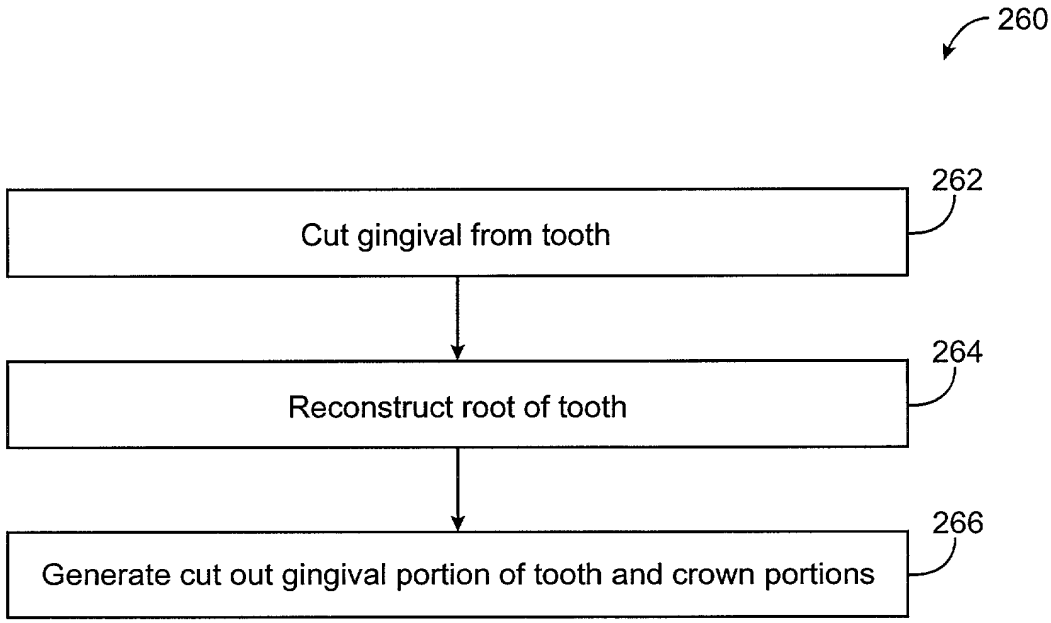
260
262
Cut gingival from tooth
264
Reconstruct root of tooth
266
Generate cut out gingival portion of tooth and crown portions

FIG. 9

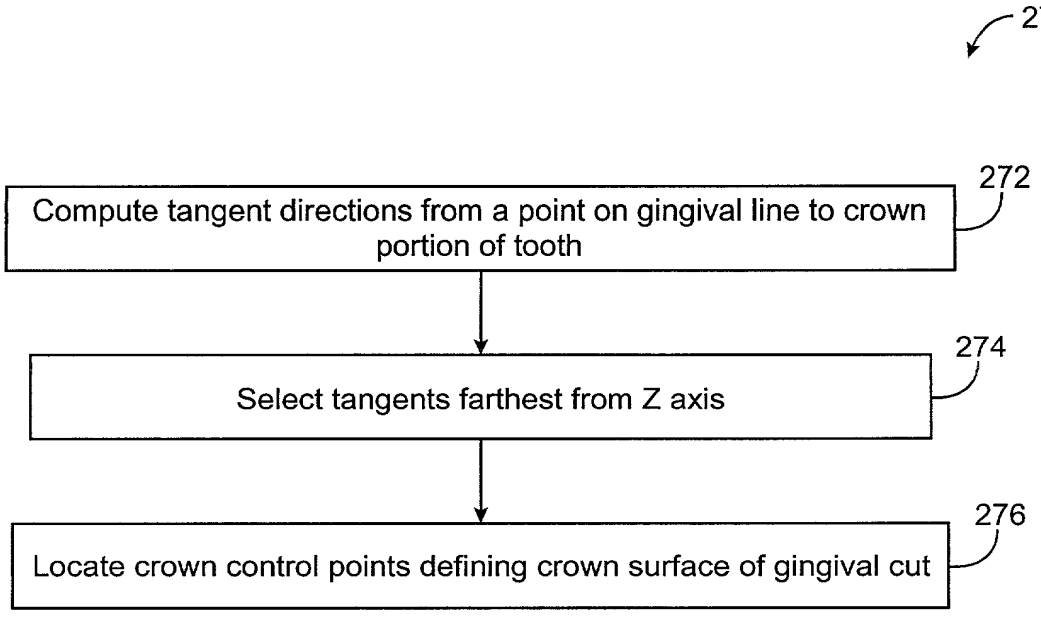
270
272
Compute tangent directions from a point on gingival line to crown portion of tooth
274
Select tangents farthest from Z axis
276
Locate crown control points defining crown surface of gingival cut

FIG. 10

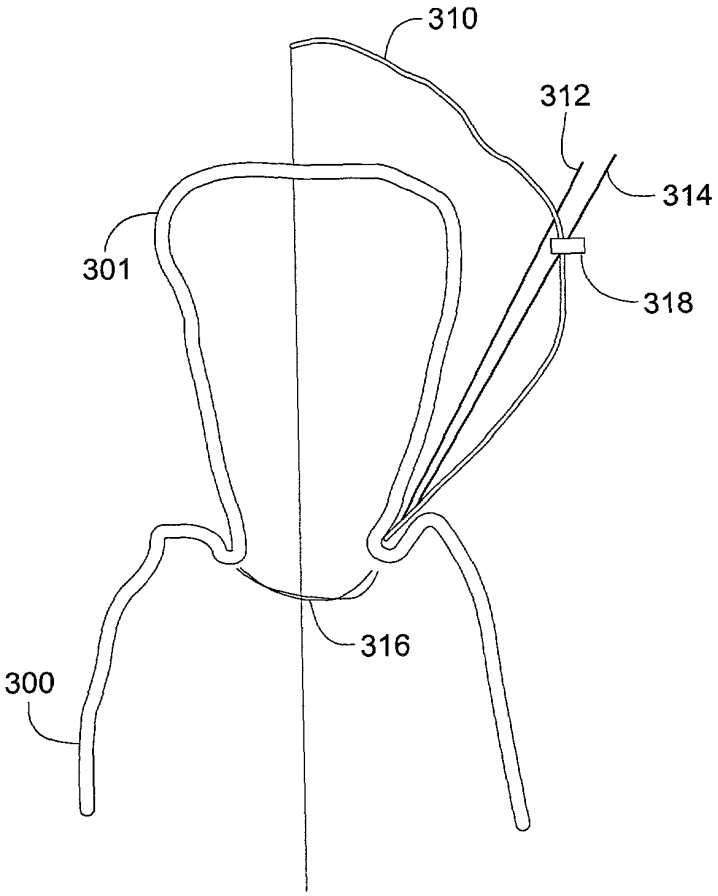

FIG. 11

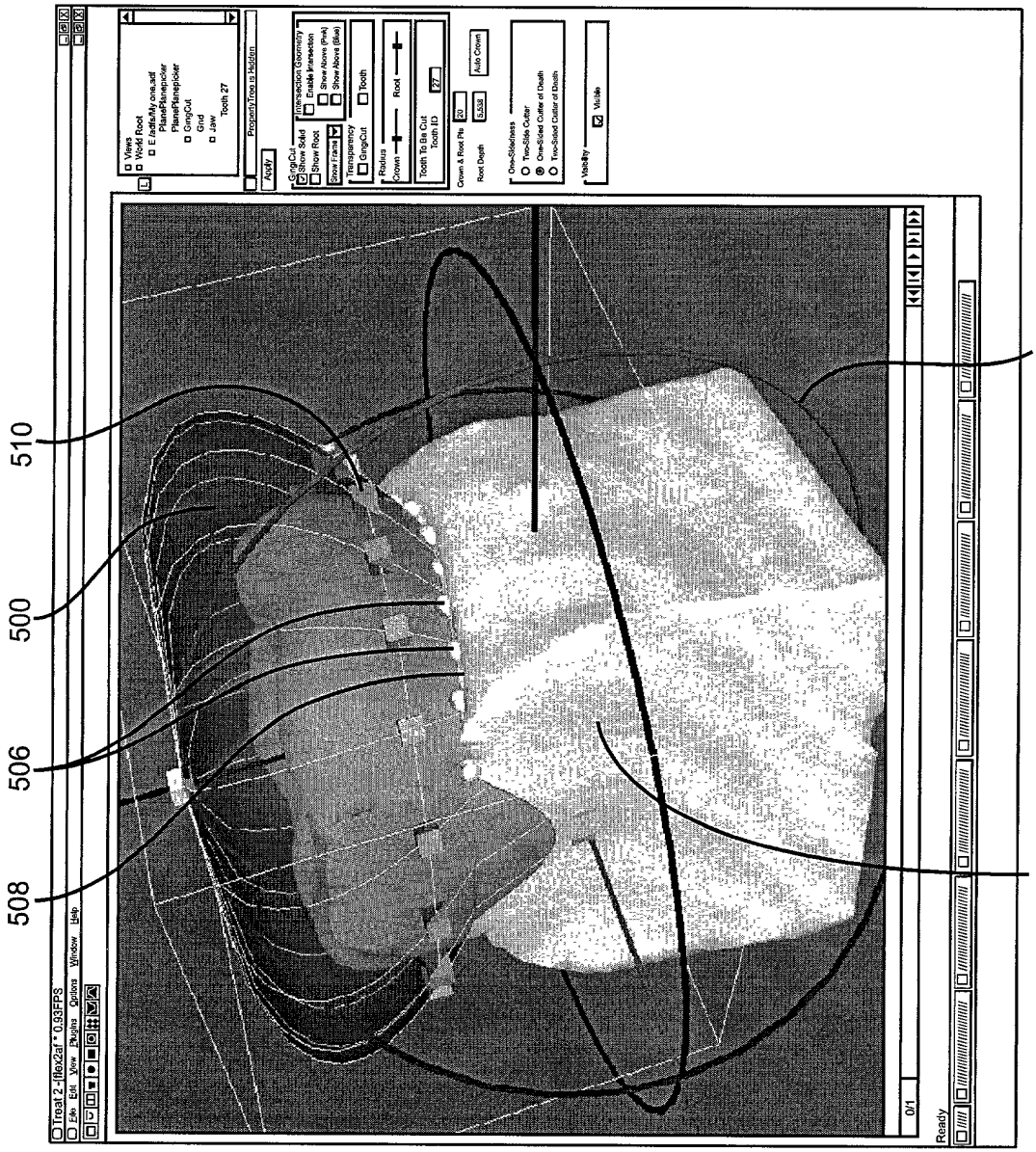

FIG. 12

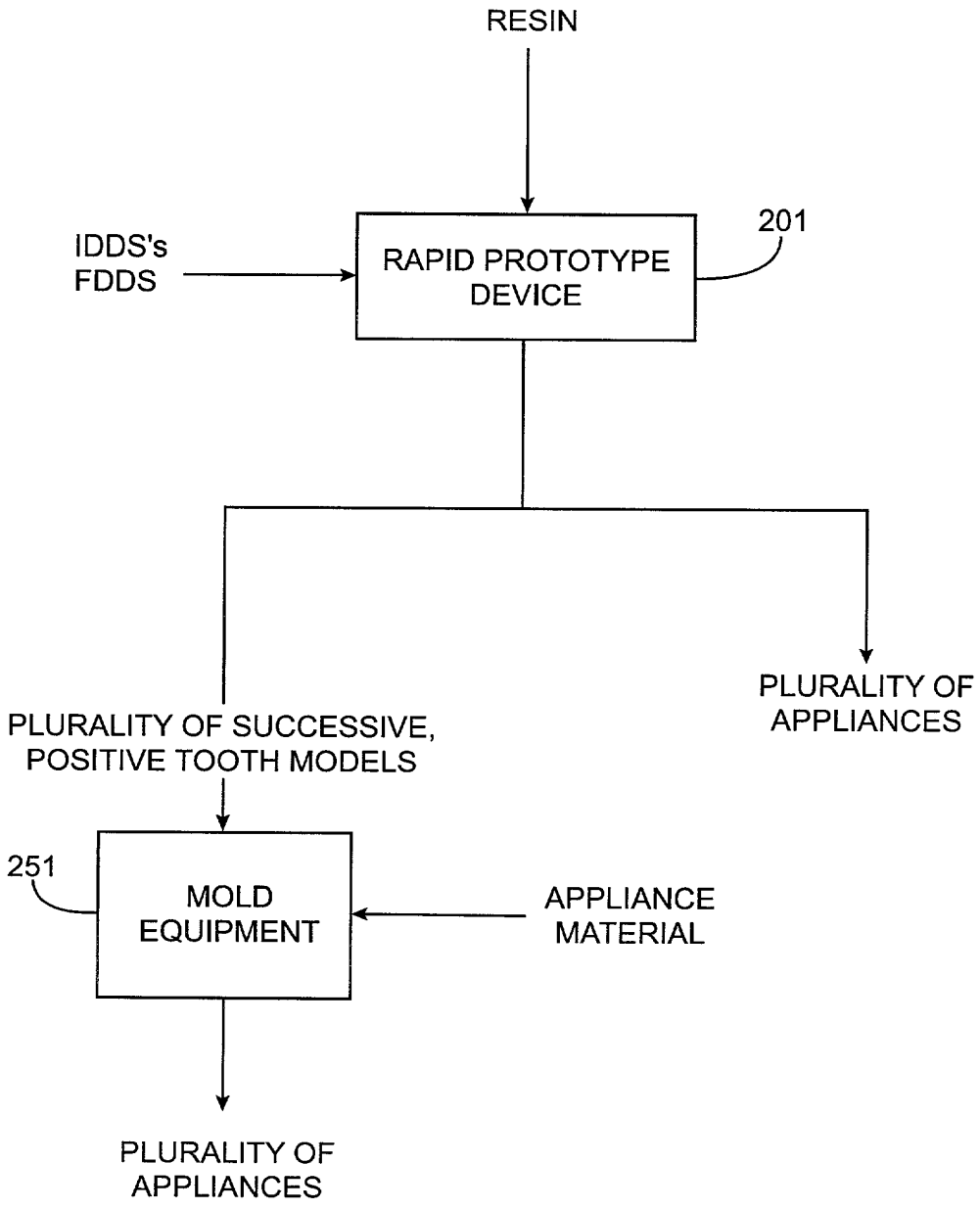
RESIN
IDDS's
FDDS
RAPID PROTOTYPE
DEVICE
201
PLURALITY OF
APPLIANCES
PLURALITY OF SUCCESSIVE,
POSITIVE TOOTH MODELS
251
MOLD
EQUIPMENT
APPLIANCE
MATERIAL
PLURALITY OF
APPLIANCES

FIG. 13

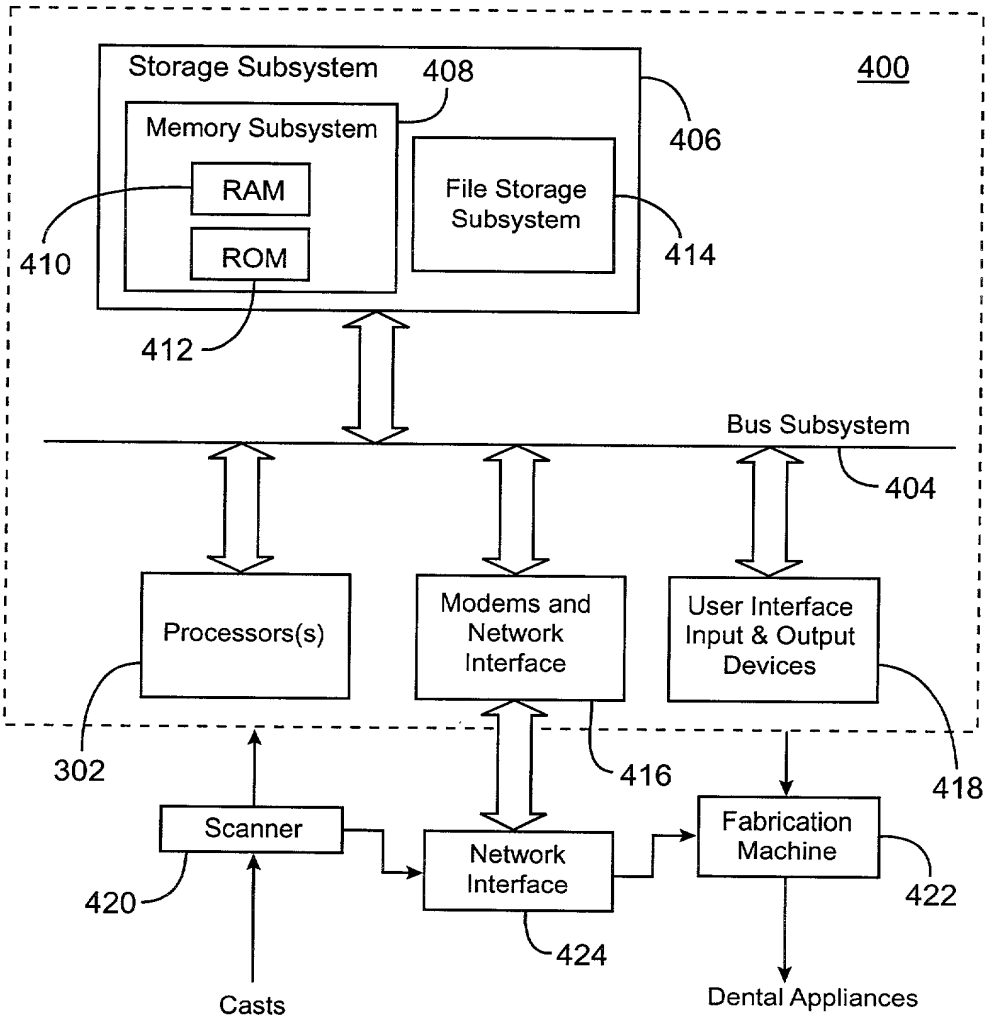
Storage Subsystem
408
400
Memory Subsystem
406
RAM
File Storage Subsystem
410
ROM
414
412
Bus Subsystem
404
Processors(s)
Modems and Network Interface
User Interface Input & Output Devices
302
416
418
Scanner
Fabrication Machine
Network Interface
420
422
424
Casts
Dental Appliances

FIG. 14